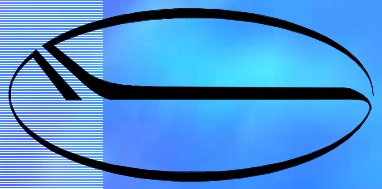
MAKING YOUR DATA SMART

Promoting Industry Standards

Background

History

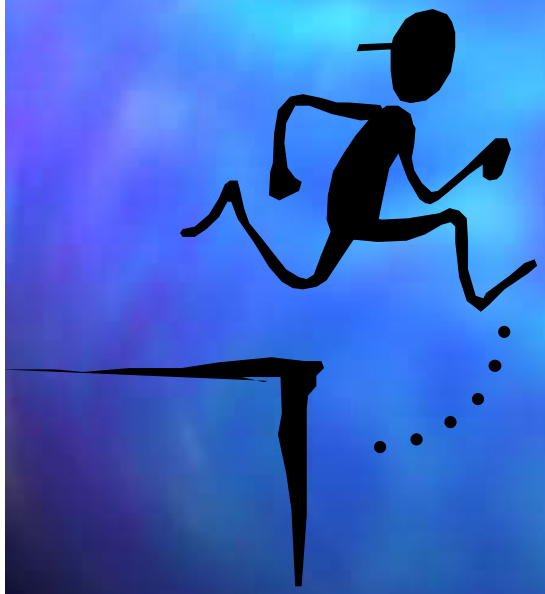
Future



Air Transport Association
Technical Information Communications Committee
Flight Operations Working Group

Background of Industry Standards for Flight Operations Information

Flight Operations Information



Flight Operations information has very few standards!

Levels and hierarchy of information are often not defined or they are misunderstood!

Flight Operations Information
...Operating Manuals Review

- ✓ ICAO *(187 Member states)* requires standard information
- ✓ Manufacturers *(5 major)* deliver information in diverse structures and formats
- ✓ Operators re-format and deliver internal documentation in some common format
- ✓ Regulators (*JAA, FAA, T/C)* require *(and audit for)* standard information across fleet types

Flight Operations Manuals

ICAO

Regulates, Lists Manuals

ICAO Regulates

- Dictates to all member states (187) basic requirements for flight operations information in ANNEX 6
- Member states must comply to fly internationally or file a difference of non-compliance

ICAO Lists required manuals

(can be combined)

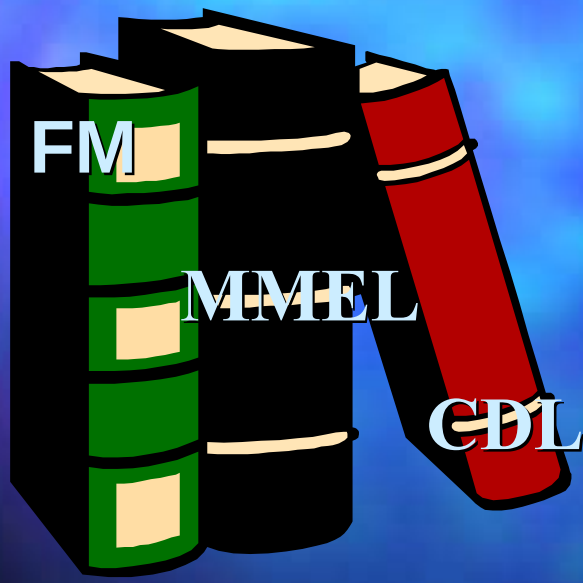
a) policy and administration manual;
b) aircraft operating manual;
c) minimum equipment list (MEL) and configuration deviation list (CDL);
e) training manual;
f) aircraft performance manual;
g) route guide;
h) emergency evacuation procedures manual;
i) dangerous goods manual;
j) accident procedures manual; and
k) security manual

Flight Operations Manuals

Manufacturers

Source, Delivery & Standard

Manufacturer Source Documentation



Airplane Flight Manual (AFM) Approved information in manufacturer's jurisdiction

Master Minimum Equipment List (MMEL)

(Configuration Deviation list…CDL and others)

Manufacturer Delivery of Manuals to Operators

Flight Crew Operating Manual (FCOM)

- Expanded procedures based on the AFM

Flight Crew Training Manual (FCTM)

- Manufacturer Training Department

Master Minimum Equipment List (MMEL)

- Engineering and Maintenance

Standards for Manuals between Manufacturers?

FCOM…

None except low level Document Type Definition

	AIRBUS	BOEING	BOMBARDIER	EMBRAER
VOLUME 1	**Systems** Arranged by: ATA Spec	Limitations Normal Procedures Supp Procedures	**Systems** Arranged by: Alphabetic	General Limitations Emerg/Abnormal Normal Proc Performance Flight Planning Weight and Balance Loading Config Dev List Min Equipt List Emerg Info Emergency Evac Grnd Servicing
VOLUME 2	Loading T.O Perf Land Perform Special Ops Flight Planning	**Systems** Arranged by: Alphabetic	Limitations Checklists Normal Ops Supp Procedures Emergency Abnormals Performance Spec Ops In Flight Checks	**Systems** Arranged by Chronological Use
VOLUME 3 & 4	Limitations Abnormals Std Oper Proc Supp Technics In Flight Performance Engine Out Ops FMGS Volume			
QRH	Emergency Abnormals	ALL Non-normals ALL Performance	Warnings Cautions	Normals Section Abnormals: Emergency Cautions
FORMAT	SGML w/FrameMaker CD-ROM (html) Paper	Some SGML FrameMaker , Word PDF Paper	Quicksilver / (Interleaf) Paper	Word, PDF Paper
PAGE	5.83 x 8.27 (A5)	5.5 x 8.5	8.5 x 11	5.5 x 8.5

Standards between Manufacturers Manuals?

FCTM…

None….

Advanced Qualification Program (AQP)…

No wide standard

MMEL…

Standard Document Type Definition (DTD) by Air Transport Association (ATA)

Flight Operations Manuals

Operators

Regulators, Industry & Internal Standards

State Regulators require Manuals for Operators

Aircraft Operating Manual (AOM) (FAA...CFM)

Flight Crew Training Manual (FCTM)

Flight Operations Manual (FOM) (FAA…COM, FOPM)

Minimum Equipment List (MEL)

These manuals must be be Approved/Accepted by regulators

Industry Standards for Operator Manuals

Joint Airworthiness Authorities (JAA Europe) stipulates structure standard of FOM and AOM, BUT otherwise...

MEL Usually produced by ATA Std

AOM (FCOM) … No Standard

FCTM…No Standard

FOM …No Standard

Most Large Commercial Operators Use Internal Standard

Internal structures for manuals are made common by most operators for use by flight crews

WHY?

Internal Standard of Manuals for Commercial Operators

- ✓ Standard structure of manuals increases user acceptance of information
- ✓ Standard location of information between fleets for users transition between aircraft types
- ✓ Mental Model of information is enhanced in company procedures and policies

Support Standard...
NASA / FAA Document Project

"Across fleet standardization should be established at several levels, from operational philosophy through procedures, to the use of common formats and terms in the different fleets. Operators should establish formal working groups and processes to ensure standard procedures across fleets. "

Support Standard...
NASA Report

"We recommend a three-way approach for a cross-fleet standardization. (1) development of a cross-fleet philosophy, (2) creating a cross-fleet standardization forum, and (3) obtaining input for procedural design from personnel that design, certify, teach, use and check procedures. "

Flight Operations Manuals

Regulators

ICAO, JAA, FAA

ICAO Standards

An operator's documents system should ensure standardization across flight document types, including formatting, writing standards, standard writing style, terminology, use of graphics and symbols and formatting across documents. This includes a consistent location of specific types of information, consistent use of units of measurement and consistent use of codes.

FAA...

"Principle Operations Inspectors (POI's) should ensure that operators standardize their operating procedures both within and across aircraft types to the greatest extent possible"

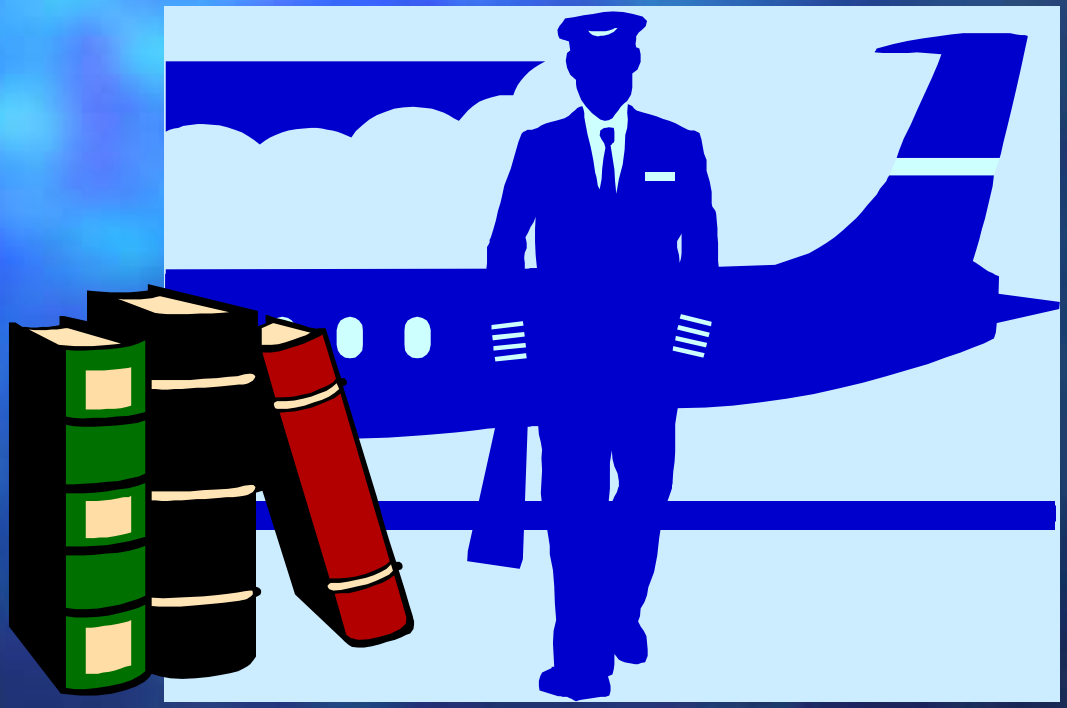
"...Standardized procedures promote understanding and effective communications between crewmembers…Crewmembers of most large operators operate numerous different aircraft during their career. Standardized procedures enhance a crewmember's transfer of learning...complete standardization of procedures is not possible when there are significant differences between manufacturers and installed equipment. A high degree of standardization, however, is possible…"

JAA...

"Since it is believed that a high degree of standardization of Operations Manuals within the JAA will lead to improved overall flight safety, it is strongly recommended that the structure described in this IEM (interpretive explanation material) should be used by operators as far as possible."

Desired Result is Common Manuals

Deliverable to the user by the operator



Flight Operations Information

…Operating Manuals Review

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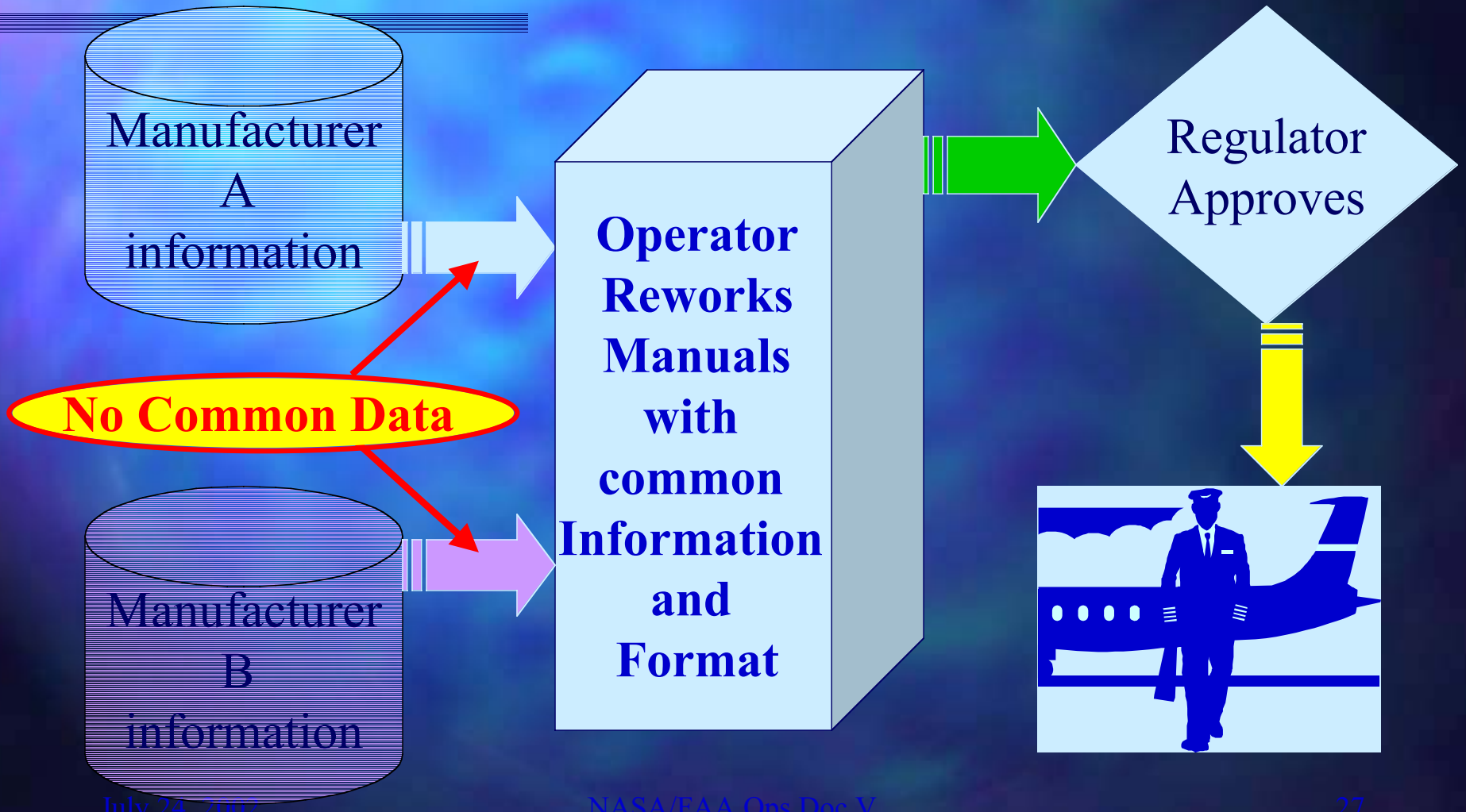
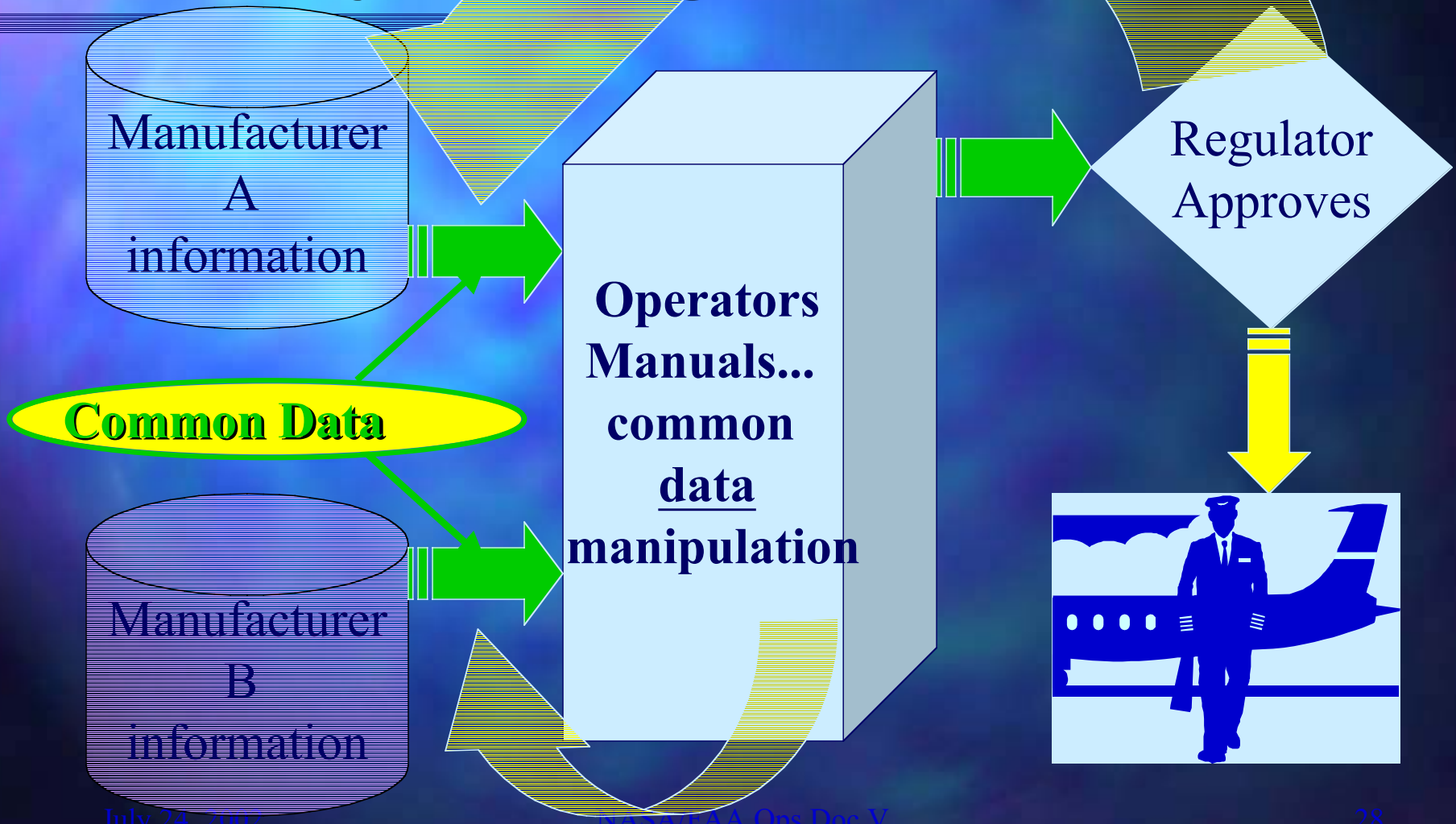
- ✗ **The Disconnect … No common format or data specification for Operating Documents**

Disconnect from Manufacturer to what is Required!



Who will dictate? Industry or Regulator ?



Who will develop some standards in the industry?

IDEAS?

? Regulators…

? Manufacturers…

? Operators…

? Support groups…

? Third party vendors…

? Industry organizations…

Silos even within each group

Regulators...

- JAA tries to do this but is not popular amongst member (and non-member) states
- Added expense to comply when manufacturers do not comply
- Individual states force additional expense to airlines under jurisdiction

Manufacturers...

- They provide information based upon legacy formats
- They are interested in selling proprietary system and updates
- They are not willing to ‘share’ proprietary means with other industries due prior investments

Operators...

- Attempt to force individual proprietary ideas on industry as a whole
- Each operator has individual formats and structures of information
- Each operator has specific needs, i.e., areas of operations, large and small operations, etc.

Support Groups

- Human Factors (HF)
- Advanced Crew Qualifications (AQP)
- Crew Resource Management (CRM)
- Flight Operations Quality Assurance (FOQA)

Each have differing ideas of applications for flight operations documentation

Third Party Vendors

- Corporate proprietary standards
- Adobe®, Microsoft®, Jeppessen®, Honeywell®, IBM®, many others
- Industry would be at the mercy of corporate entity

Industry Organizations

- ICAO…regulator at the highest level
- IATA…standards development with ICAO
- ATA…industry organization known for specifications development

With NO standards…

How do we begin?

Meet with Manufacturers, Operators and Vendors within an Industry Organization!

Air Transport Association (ATA)

Air Transport Association
Technical Information Communications Committee
Flight Operations Working Group

Flight Operations Working Group History

ATA-TICC-FOWG-BIA…

Say what??

- Air Transport Association (ATA)
- Technical Information and Communications Committee (TICC)
- **Flight Operations Working Group (FOWG)**
- In conjunction with the Business Information Architects (BIA)
- Report to the ATA:
  - Senior Director, Technical Data Standards / TICC Executive Committee (EXCOM) / VP, Flight Operations / VP, E-Business

Flight Operation Working Group

- Current group since 1997
  - ✈There were attempts prior to this 1989-90 however difficulty in defining paper/word processing standard
- Up to 15 Air Carrier / Operators
- All 5 major Manufacturers
- Up to 12 vendors/consultants/suppliers
- International representation!

Flight Operations Working Group
Mission Statement

"To develop a specification for the cost effective and efficient interchange of digital data between Information Providers and Information Users for Flight Operations"

Specs in Maintenance:

Illustrated Parts Catalogue
Trouble Shooting Manual
Aircraft Maintenance Manual
Master Minimum Equipment List

ATA Systems ✓

AIPC
AMM
MMEL
TSM

Compare

Specs in Flight Operations?

ATA Systems ✗

Phase of Flight ✗

Limitations
System Description
Abnormals
Performance
Procedures

Electronic Data Development in Aviation Industry Today?

Maintenance Area

- Fully supported by previous common information structures
- Current ATA Numbered Systems in Spec *i*Spec 2200 (Old Spec 100)

Flight Operations Area

- No previous common information structures
- No previous specification
- ATA Flight Operations Working Group Promotes Data Transfer in *i*Spec 2200

NASA/FAA Operating Documents Project

Design and use of Operating Docs (Kanki/Seamster 2000) ratings…6 areas of publications rated by 24 major operators

Highlights to address from each area:

- Reducing Number of Documents 4.44
- CRM Procedures and Policy 4.22
- Standardization Across Fleets 4.33
- Training of New Procedures 4.11
- HF of Checklist Design & Format 4.22
- Guidelines for Electronic Docs 4.11

* 5 Point Scale 5= Most Important

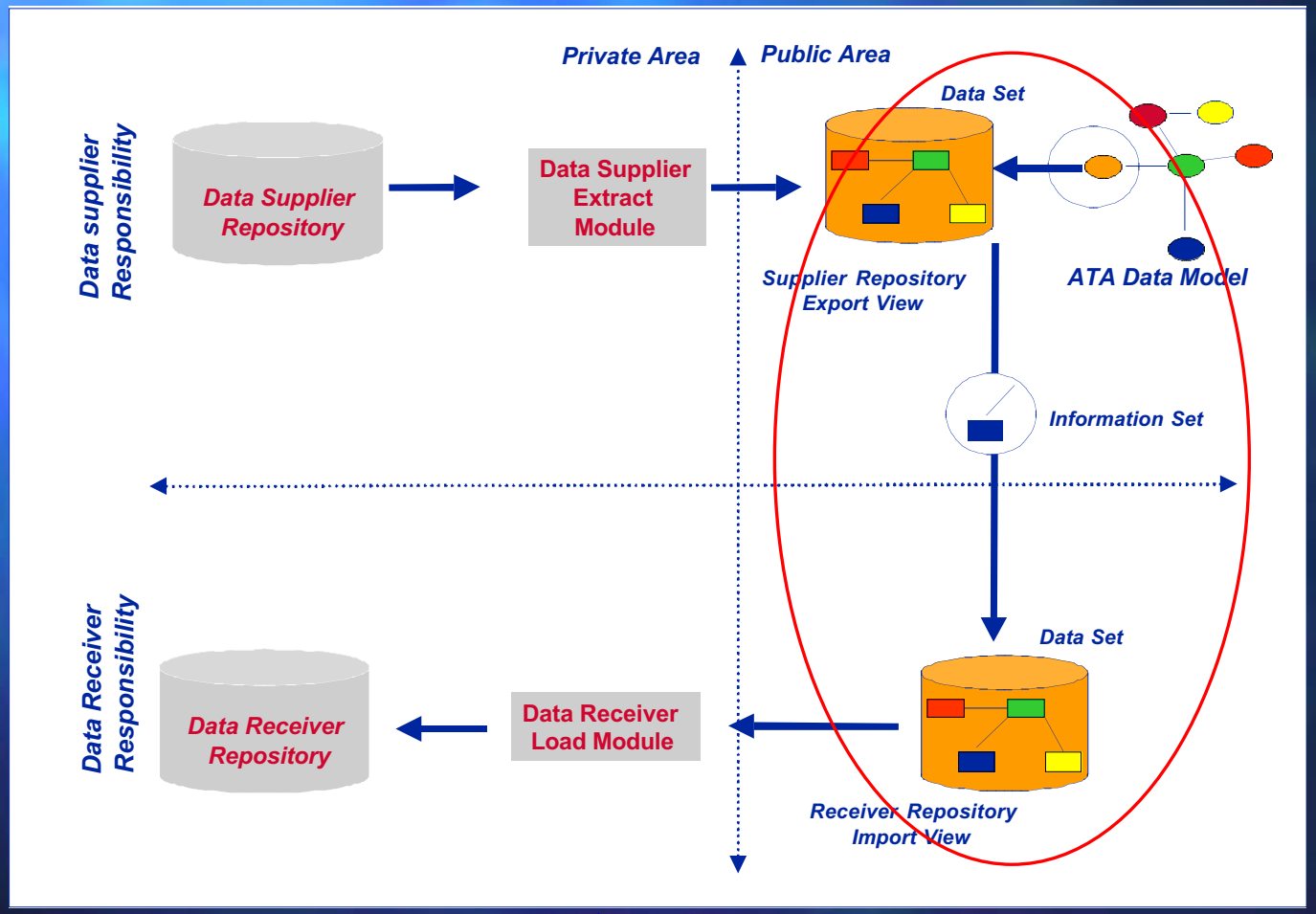
Flight Operations Working Group
Industry DATA Transfer

- Not concerned with text in manuals but of DATA identification for sharing amongst computers and flight operations information users
- Makes manipulation of electronic DATA possible in the future
- Does not enforce information layout in documents (however will help structure if desired)

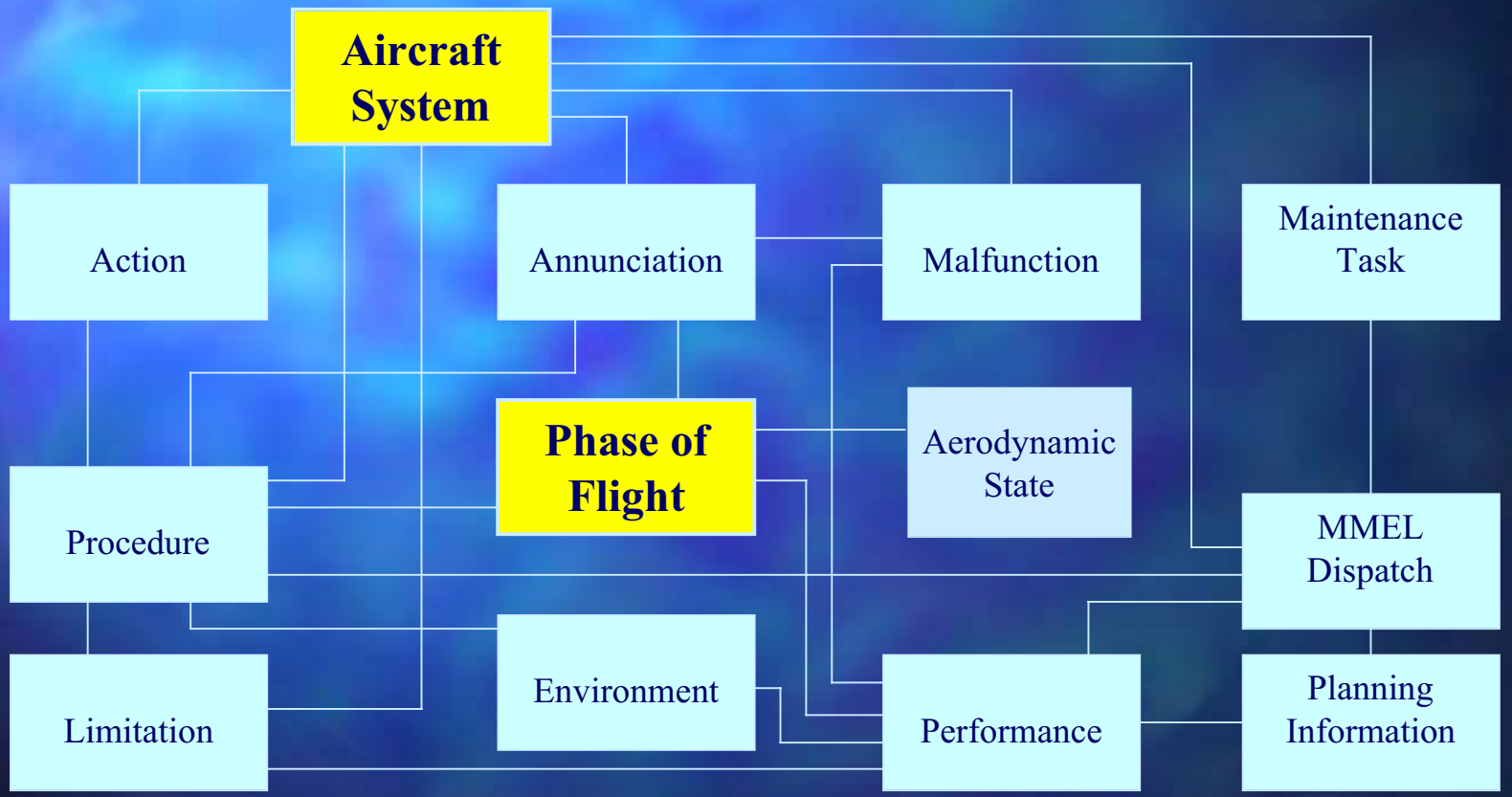
Progress...of FOWG

- Up-to-date Master Document and all activities including 4 (3day) meetings/ yr industry presentations
- Currently reflects:
  - Data decomposition and validation of the data model has been done with current manufacturer manuals
  - Manufacturers…Airbus, Boeing, Bombardier, Fairchild Dornier…agree to work with the data model to develop a transfer model for data

Transfer of Data



ATA Data Model...(1st step)
(Simplified ATA FOWG DATA Model)



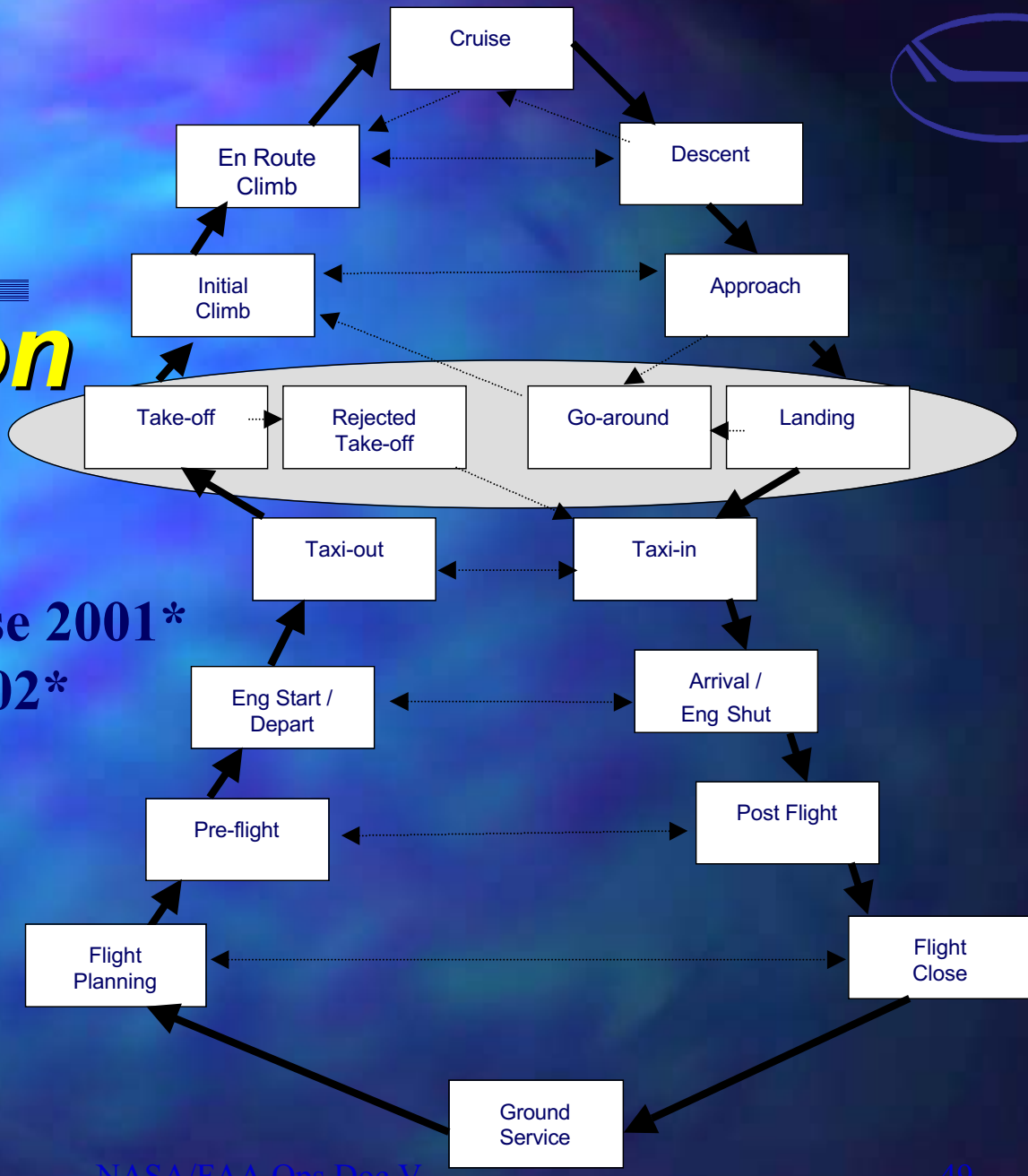
ATA Systems Specification

@Two Digit Level Only*

* *i*Spec 2200 for flight operations use

20 General
21 Air Conditioning & Pressurization
22 Autoflight
23 Communications
24 Electrical
25 Equipment
26 Fire Protection
27 Flight Controls
28 Fuel
29 Hydraulics
30 Ice and Rain Protection
31 Indicating & Recording
32 Landing Gear
33 Lights
34 Navigation
35 Oxygen
36 Pneumatics
38 Water & Waste
45 On Board Maintenance
49 Auxiliary Power
52 Doors
56 Windows
71 Power Plant

ATA Phase of Flight Specification



- ✈Introduced 1999
- ✈Recommended for Use 2001*
- ✈Approved for Use 2002*

* *i*Spec 2200

3 letter ID; not sequentially numbered : can be used and interspersed with orbital craft for future

Future of Data…

Links Basic Entities

ATA Systems

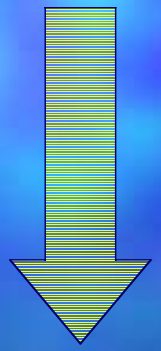
20 General
21 Air Conditioning & Pressurization
22 Autoflight
23 Communications
24 Electrical
25 Equipment
26 Fire Protection
27 Flight Controls
28 Fuel
29 Hydraulics
30 Ice and Rain Protection
31 Indicating & Recording
32 Landing Gear
33 Lights
34 Navigation
…Etc.

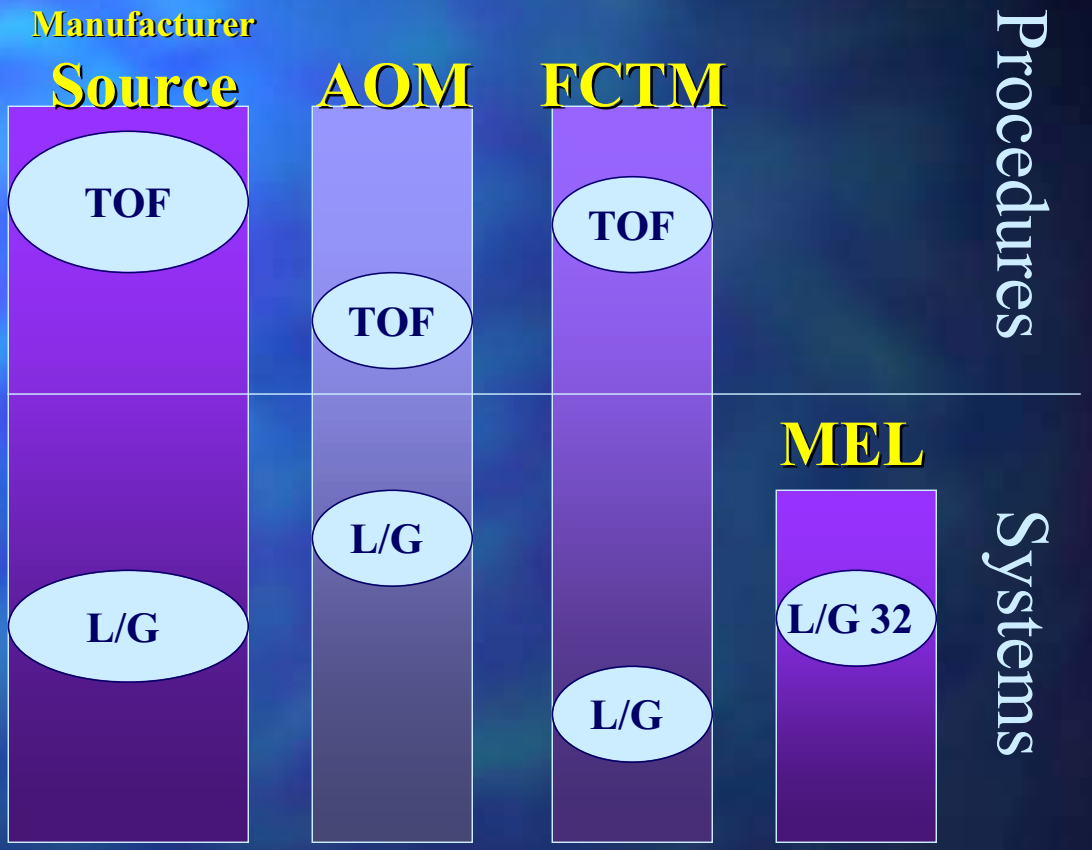
ATA Phases of Flight

FLP Flight Planning
PFL Pre-flight
ESD Engine Start / Depart
TXO Taxi-out
TOF Take-off
RTO Rejected Take-off
ICL Initial Climb
ECL En Route Climb
CRZ Cruise
DES Descent
APR Approach
GOA Go-around
LND Landing
TXI Taxi-in
AES Arrival / Engine Shutdown
…Etc.

Current Access
Information by Document Systems

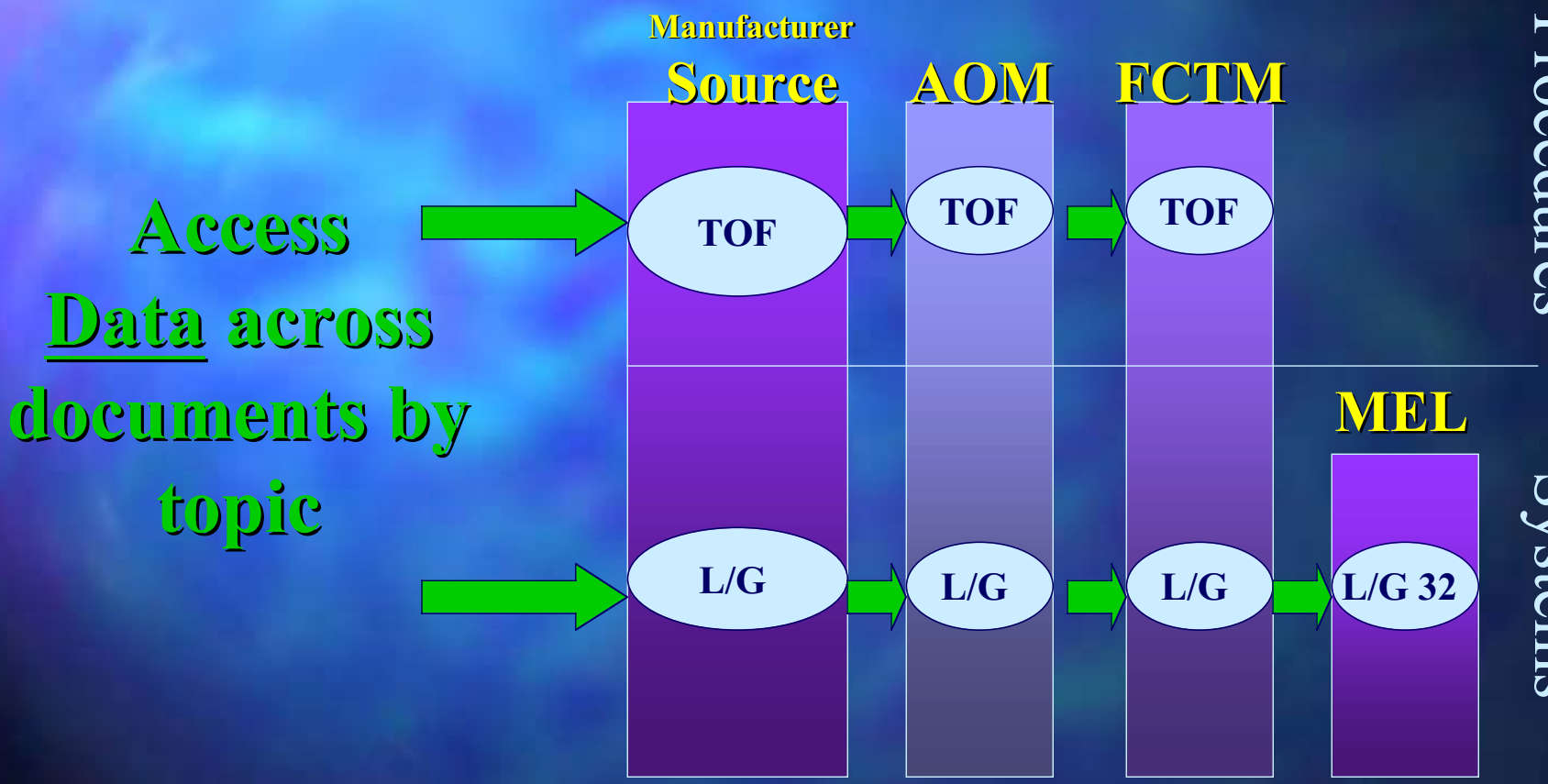
We currently access information from within specific documents in this manner





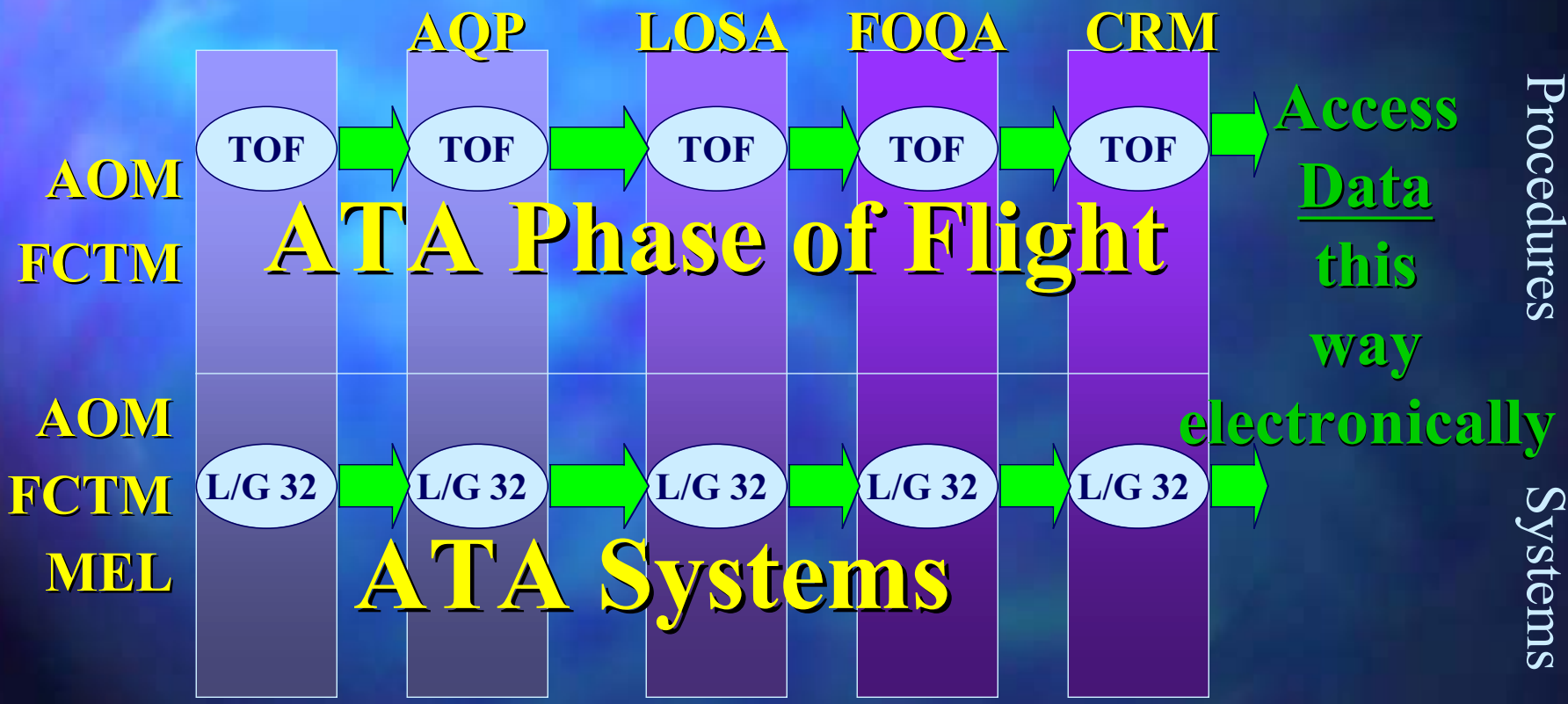
Concept of paper manuals is changing

Future Access
Information by Electronic Data Recovery



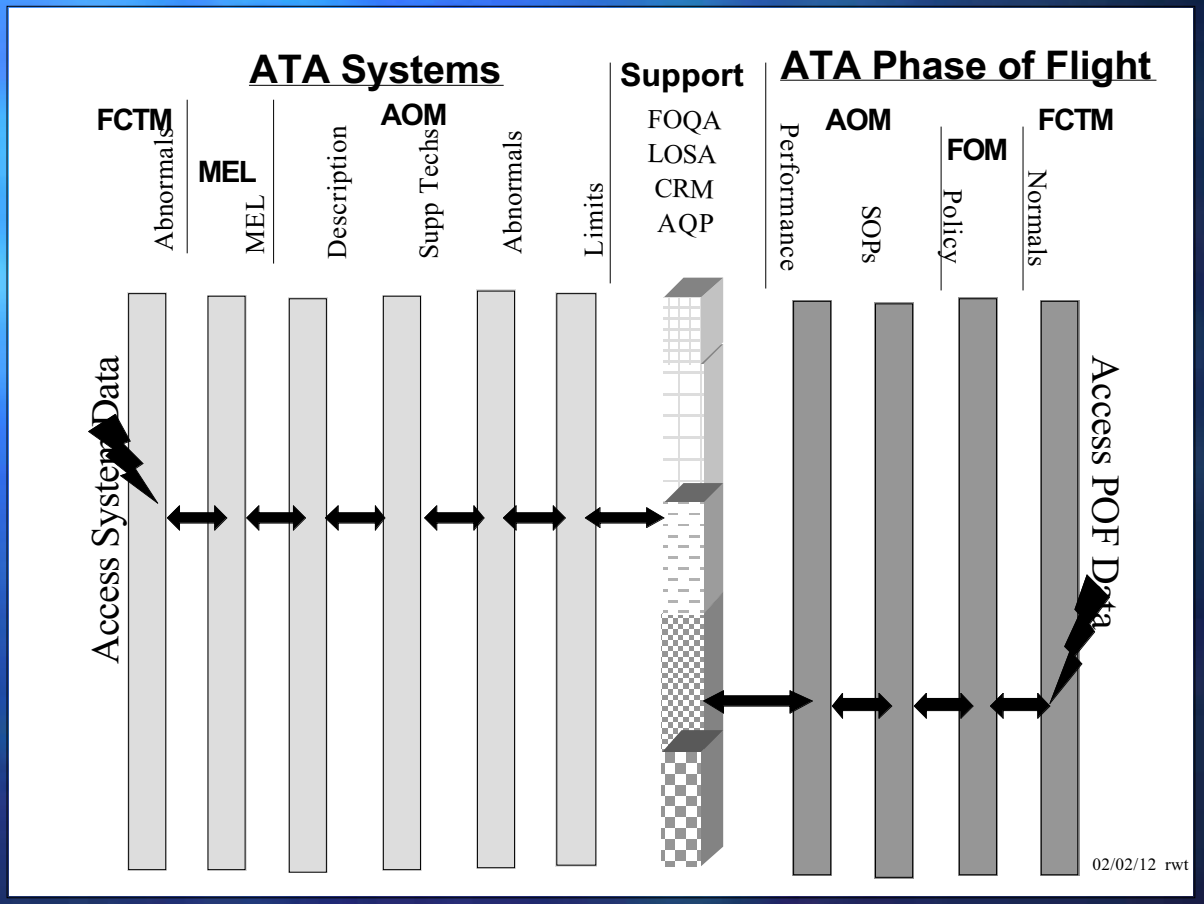
Concept of paper manuals is changing

Sharing Electronic Data Throughout Flight Ops



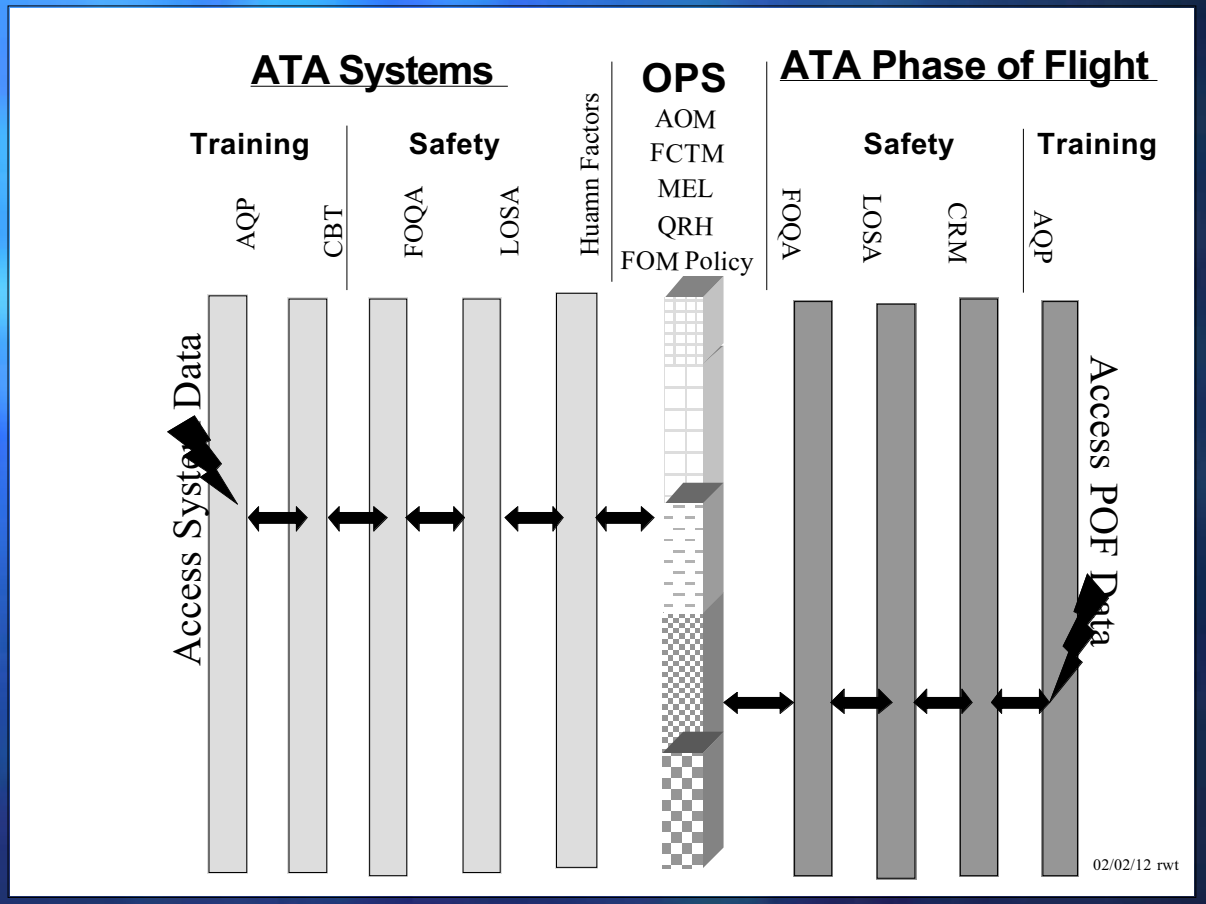
Concept of shared information is changing

Data Tagging Across Document Systems



Data Tagging Across Support Disciplines

YES...Mapping or Cross-reference is Possible



Air Transport Association
Technical Information Communications Committee
Flight Operations Working Group

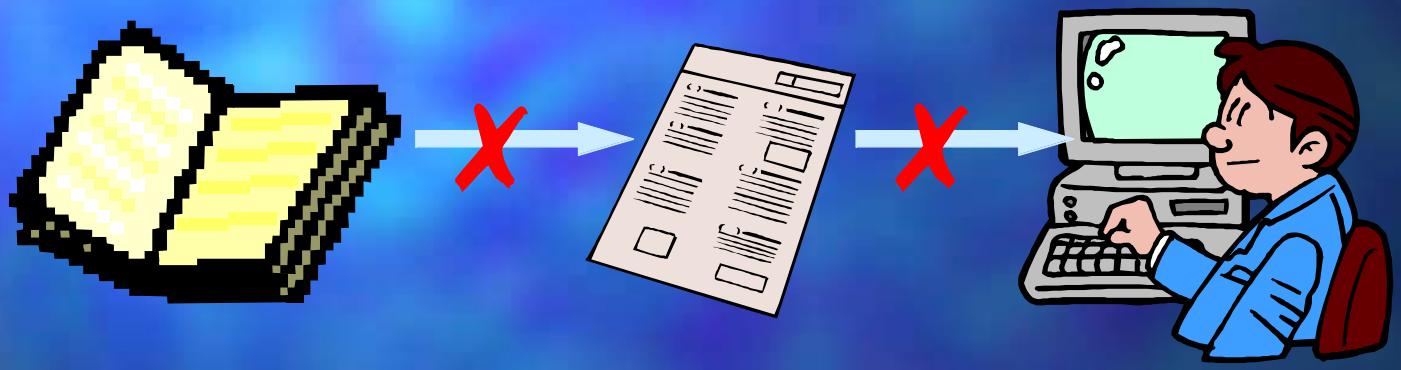
Flight Operations Working Group FUTURE

Target for completion

Flight Operations Data Transfer Spec by First Quarter 2004

Short term view must expand

Stop thinking of page based information

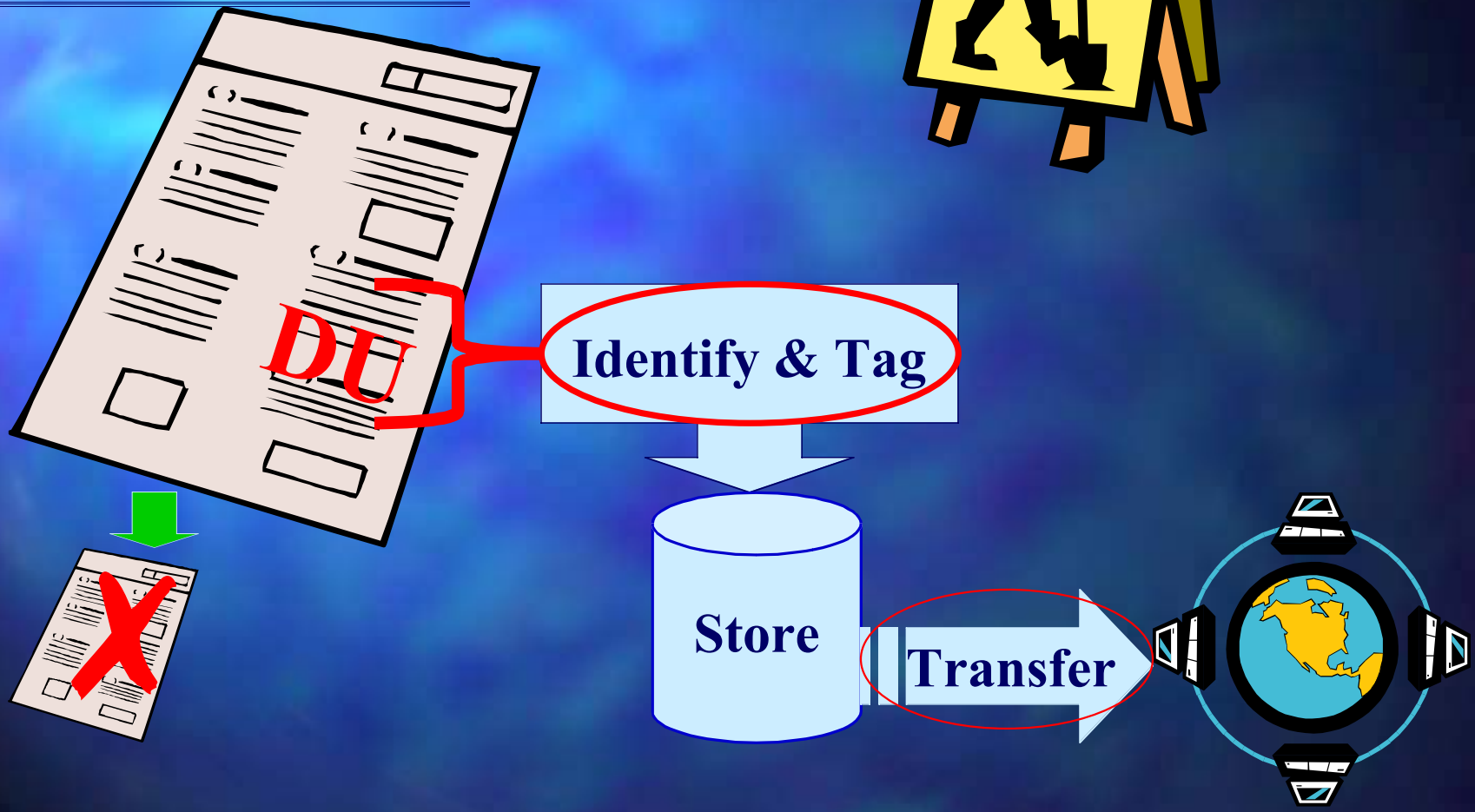


FOWG is not developing a page viewer

Agreement within the FOWG

- Document Fragments (Documentary Unit) (Minimum Transfer Unit) (Work Unit) (Information Set) must be identified
- Data Model completed and basis of units identified
- Meta-data tagging … use identified
- Documentary unit approval level (No longer page based)

Work in Process…



Documentary Unit (DU)

- Establish Data Content e.g., ”Procedure”
- Identify Meta-data:
  - Specification in “Phase of Flight” and/or “System” ✓
  - Revision / Effectivity / Authorizing signature... ✖

Meta-Data in Flight Ops?

"Metadata is data associated with objects which relieves the potential user of having full advance knowledge of their existence or characteristics."

"If a resource is worth making available, then it is worth describing it with metadata, so as to maximize the ability to locate it."

Quotes from Article by C. Taylor, U of Queensland kindly proffered by Doug Yagaloff

Meta-Data in Flight Ops?

"Metadata provides the essential link between the information creator and the information user."

Quote from Article by C. Taylor, U of Queensland kindly proffered by Doug Yagaloff

Example of DU associated with Meta-data

DU Content:

Start

"Procedure"

Link

DU Content:

EGT

"Limitation"

Mtce Link

Meta-data:

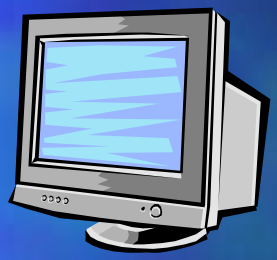
- APU (49) System
- Preflight (PFT) Phase
- Aircraft serial number (XXX) Effectivity
- Change of 'intake seal' (YYY) Revision
- Authority Signature

FOWG & Industry…
Already Beyond Theory

- Hardware
- Software
- Consultants & Vendors
- Operators
- Manufacturers
- Regulators

Have ability today

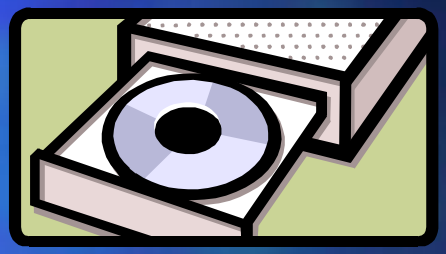
FOWG & Industry…Already Beyond Theory



Hardware Today

- Personal computers and servers currently have all required computing power, speed and memory required
- Regulators (FAA AC120-75) allow or even promote use of electronic devices (laptops) for all information and data collection and retrieval and calculations in the flight deck
- Some vendors developing proprietary hardware for this purpose
- Cockpit security may require viewer…thus making room for information retrieval

FOWG & Industry…Already Beyond Theory



Software Today

- Current ‘viewers’ are in use for PDF® pages from the paper documents
- W3C Web standards for XML and transfer from SGML
- x 509 Standards for electronic signatures
- Software vendors supporting structured documentation and Meta-data
- Software transfer standards supported by proprietary and non-proprietary means
- Some non-proprietary and shareware already available for support

FOWG & Industry…Already Beyond Theory

Consultants & Vendors Today

- Information Technology (IT) expertise is available in XML/meta-data/transfers
- IT industry requires standard specifications in order to market value added systems
- IT industry has commercial interest in industry specification knowledge
- IT industry will guide hardware and software requirements to benefit industry

FOWG & Industry…Already Beyond Theory

Operators Today

- All major operators are moving toward electronic documentation
- Some investments are very mature in sophisticated systems but lack industry data standard for input
- Investment decisions must be made with view to future (not page based viewers)
- All knowledgeable operators acknowledge long term solution required

FOWG & Industry…Already Beyond Theory

Manufacturers Today

- Concept accepted for single industry standard for information delivery
- Proprietary system can be supported internally
- Proprietary system can be marketed externally (Value added to customers if desired)
- Each manufacturer needs ability to provide system capability for industry information delivery (i.e., flight bag marketing, B training A products, etc)
- Re-usable approved data internally

FOWG & Industry…Already Beyond Theory

Regulations Today

- JAA structured books required
- FAA Support for laptop use (120-75)
- Approval for electronic signature for transfer of information under way
- Approval for some operators for revision unit (documentary unit) at section level rather than page level
- Standardization of documentation, accuracy of information and lack of duplication supported
- Electronic audit support

FOWG & Industry…
Already Beyond Theory

Efforts today are already beyond that of defining paper page based viewers…

Specifications today are needed for development of data support for the future.

Long Term and Theory...

Real time conditional processing of self assembling information.

- In other words...information based upon real time (phase of flight), multiple system condition (systems normal or non-normal) taking into account external conditions e.g. wx, icing, security threat, etc

Today's efforts will support this in future!

Current efforts by Eurisco…Jean-Phillipe Ramu at HCI in Boston MIT in October

ATA Member Airlines...

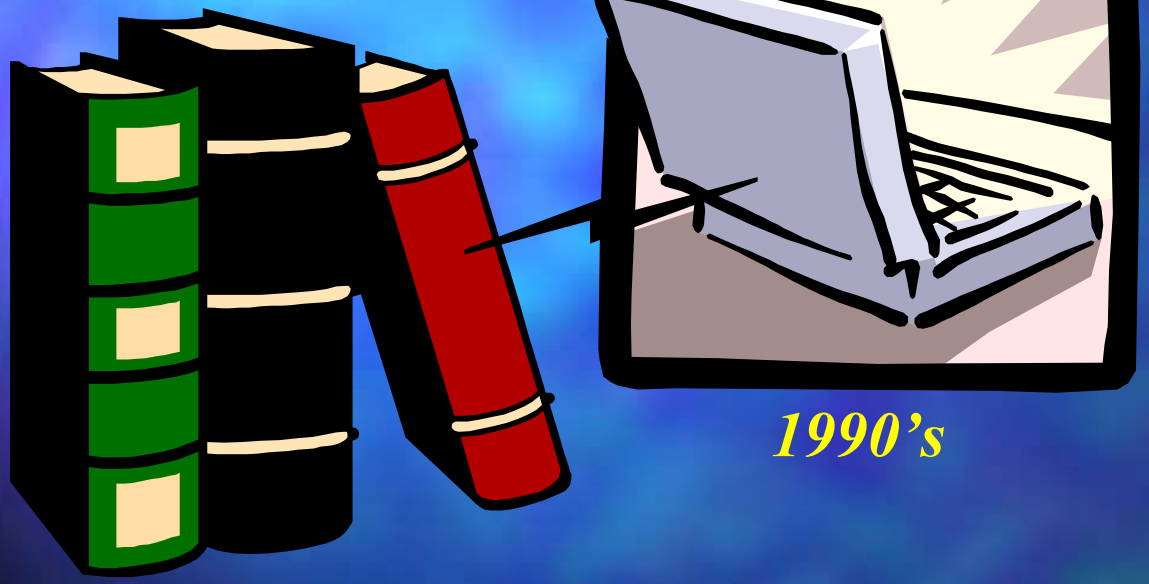
The ATA Flight Operations Working Group needs your support…

- These issues will not ‘go away’ and will be dealt with now or at a greater cost in future!
- Investment in time and money without Specs can be wasteful in the short term!

Does your management understand the issues of Flight Operations information transfer, storage and manipulation for the future?

Future Data Transfers

1980's



1990's

2000& beyond

ATA Flight Operations Working Group (FOWG)

More Information?

Air Transport Association

Technical Information Communications Committee (TICC)

Flight Operations Working Group

Thank you...on behalf of ATA
Flight Operations Working Group

Co-chairs:

Rick W. Travers

Jean Neron (Air Canada)

Regional Coordinators:

America's Terrie Parsons (Continental)

Europe/Africa Matthias Schmitt (Lufthansa)

Asia/Orient Ian Williams (Cathay)